DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 5 and 10 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 5, 6, 10, 20, 23, and 26-29 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 6,118,564 to Ooi et al.

As to **Claim 5**, *Ooi* discloses a method for controlling bias of optical modulator (Fig. 4, 22 labeled a switch, but Fig's 4 and 6 show the optical signal being modulated with a clock and low frequency signals) for controlling a DC bias of each of a plurality of optical modulating sections of an optical modulator (Fig. 4, bias supply circuit (28) provides a bias signal for sections 22a and 22b) comprising an optical waveguide formed on a single substrate with an electro-optic effect (Fig. 20 shows the modulator formed on a single substrate), and the plurality of optical modulating sections for modulating optical waves propagating through the optical waveguide (Fig. 4, sections 22a and 22b modulate the optical waves entering from the left), and being configured so as to combine the optical waves modulated by the plurality of optical modulating sections (Fig. 4, signals leaving the modulating sections 22a and 22b are combined by the coupler on the right side of modulator (22)),

comprising the steps of:

superposing a low frequency electrical signal with a specific frequency on a modulating signal or a DC bias applied into at least a specific first one of the plurality of optical modulating sections (Fig. 4, low frequency signal (of frequency f_0) is superposed on the DC bias at 28, the bias is applied to modulating section 22a);

detecting a change of light intensity corresponding to the low frequency electrical signal from the optical wave exiting from the specific first optical modulating section, into which the modulating signal or the DC bias superposed with the low frequency electrical signal is applied (Fig 4, receiver (26) and filter (27) detect the change in light intensity at f_0 from the light that exits modulating section 22a); and

controlling the DC biases of the specific first optical modulating section (Fig. 4, the feedback loop controls the bias of section 22a) and at least one second optical modulating section based on the detected change of light intensity (Fig. 4, the feedback loop also controls section 22b.)

As to **Claim 6**, *Ooi* discloses wherein the control of the DC biases of said second of optical modulating section is performed by determining a controlled variable with respect to said second optical modulating section based on said change of light intensity (Col. 21, ll. 39-45, product is calculated based on intensity from detector (26) and filter (27.)

As to **Claim 10**, *Ooi* discloses a device for controlling bias of optical modulator (Fig. 4, 22 labeled a switch, but Fig's 4 and 6 show the optical signal

being modulated with a clock and low frequency signals) for controlling a DC bias of each of a plurality of optical modulating sections of an optical modulator (Fig. 4, bias supply circuit (28) provides a bias signal for sections 22a and 22b) comprising a single substrate with an electro-optic effect, an optical waveguide formed on the substrate (Fig. 20 shows the modulator formed on a single substrate with optical waveguides),

the plurality of optical modulating sections for modulating optical waves propagating through the optical waveguide (Fig. 4, sections 22a and 22b modulate the optical waves entering from the left), and

a combining element provided for the optical waveguide for combining the optical waves modulated by the plurality of optical modulating sections (Fig. 4, signals leaving the modulating sections 22a and 22b are combined by the coupler on the right side of modulator (22)), further comprising:

a DC bias application means for applying a DC bias into each of the plurality of optical modulating sections (Fig. 4, DC bias is supplied to sections 22a and 22b with bias circuit 28);

a low frequency electrical signal superposing circuit for superposing a low frequency electrical signal with a specific frequency on a modulating signal or a DC bias applied into at least a specific first one of the plurality of optical modulating sections (Fig. 4, low frequency signal from 23 is superposed via 29 and 28 on the bias signal and applied to modulating section 22a);

an optical detecting means for detecting a change of light intensity corresponding to the low frequency electrical signal from the optical wave exiting from the specific first optical modulating section, into which the modulating signal or the DC bias superposed with the low frequency electrical signal is applied (Fig 4, receiver (26) and filter (27) detect the change in light intensity at f_0 from the light that exits modulating section 22a);

and a bias controlling means for extracting the change of light intensity corresponding to the low frequency electrical signal from the optical detecting means and for controlling the DC bias application means of the specific first optical modulating section (Fig. 4, the feedback loop controls the bias of section 22a) and at least one second optical modulating section based on the extracted change of light intensity (Fig. 4, the feedback loop also controls section 22b.)

As to **Claim 20**, *Ooi* discloses wherein the optical detecting means detects an optical wave guided out by a directional coupler positioned adjacent to the optical waveguide (Fig. 4, optical coupler (25, adjacent the waveguide) sends the signal to the detecting means (26.))

As to **Claim 23**, *Ooi* discloses wherein the optical detecting means detects an optical wave, which exits from the optical modulator and is thereafter branched by an optical branching means (Fig. 4, optical coupler (25, branches the signal to the detecting means (26.))

As to **Claim 26**, *Ooi* discloses wherein the optical waveguide comprises a structure which has two sub Mach-Zehnder waveguides placed in parallel in each

arm of a main Mach-Zehnder waveguide (Fig. 20 and Fig. 4, 22a and 22b, sub Mach-Zehnder waveguides in parallel.)

As to **Claim 27**, *Ooi* discloses wherein said specific first optical modulating section is one including a first one of the sub Mach-Zehnder waveguides, and said second optical modulating section is one including a second one of the sub Mach-Zehnder waveguides (Fig. 20 and Fig. 4, 22a and 22b, sub Mach-Zehnder waveguides in parallel are first and second optical modulating sections.)

As to **Claim 28**, *Ooi* discloses wherein the optical waveguide comprises a structure which has two sub Mach-Zehnder waveguides placed in parallel in each arm of a main Mach-Zehnder waveguide (Fig. 20 and Fig. 4, 22a and 22b, sub Mach-Zehnder waveguides in parallel.)

As to **Claim 29**, *Ooi* discloses wherein said specific first optical modulating section is one including a first one of the sub Mach-Zehnder waveguides, and said second optical modulating section is one including a second one of the sub Mach-Zehnder waveguides (Fig. 20 and Fig. 4, 22a and 22b, sub Mach-Zehnder waveguides in parallel are first and second optical modulating sections.)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,118,564 to Ooi et al. and U.S. Patent 7,340,114 B2 to Doi et al.

As to **Claim 17** *Doi* discloses wherein the optical detecting means detects an optical wave emitted from the optical waveguide into the substrate (Fig's. 13, 14A, and 14B.)

Doi is from the same art with respect to optical communications, and is therefore analogous art.

At the time of the invention, it would have been obvious for a person of ordinary skill in the art to detect an optical wave that has passed into the substrate (*Doi*) in the system disclosed by *Ooi.* The suggestion/motivation would have been to measure power from light that will be lost anyway rather than tap off further light from the waveguide, thereby decreasing optical budget.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL G. DOBSON whose telephone number is (571)272-9781. The examiner can normally be reached on Mon. - Fri. 8:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Daniel G. Dobson/

Examiner, Art Unit 2613
10/16/2009

/Kenneth N Vanderpuye/
Supervisory Patent Examiner, Art Unit 2613